REMARKS

Summary

This Amendment is responsive to the Office Action mailed on April 28, 2003. Claims 1, 20, 30, 32, 51, 61, 63, and 64 are amended. Claims 21 and 52 are cancelled. Claims 1-20, 22-51, and 53-64 are pending.

Claims 1-4, 7, 12, 13, 15, 16, 20-22, 26, 28, 30, 32-35, 38, 43, 44, 46, 47, 51-53, 57, 59 and 61 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Garland (US 6,144,772).

Claims 5, 14, 17, 18, 29, 31, 36, 45, 48, 49, 60 and 62 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Garland.

Claims 6, 8-10, 37, 39-41, 63, and 64 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Garland in view of Stark (US 6,389,169).

Claims 19 and 50 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Garland in view of Ligtenberg (US 5,333,212).

Claims 11, 23, 24, 27, 42, 54, 55, and 58 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Garland and "Lossy/Lossless Region-of-Interest Coding Based on Set of Partitioning in Hierarchical Trees" by Atsumi.

Claims 25 and 56 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Garland and Maeng (US 6,476,873).

Applicants respectfully traverse these rejections in view of the amended claims and the following comments.

Discussion of Amended Claims

Independent claims 1 and 32 are amended to specify that the identified areas of interest are encoded at a first quality level and the unidentified areas of interest are encoded at a second and lower quality level than the identified areas to produce a single compressed copy of the digital image. The single compressed copy of the image can be decoded at a standard decoder (see, e.g., Applicants' specification, page 15, first paragraph).

Claims 20 and 52 are amended into independent form and to include the subject matter of claims 21 and 52, respectively. Claims 21 and 52 are cancelled to avoid duplication of claimed subject matter.

Claims 30 and 61 are amended to clarify that the quality levels of certain image areas are enhanced to artificially create additional areas of interest.

Independent claims 63 and 64 are amended to specify that the digital image is part of a sequence of related digital images (see, e.g., Applicants' specification, page 8, lines 4-6). Claims 63 and 64 are further amended to specify that each image in the sequence is encoded to produce a single compressed copy of the digital image having areas of interest encoded at a first quality level and unidentified areas of the image encoded at a second quality level. The single compressed copy of the image can be decoded at a standard decoder (see, e.g., Applicants' specification, page 15, first paragraph).

Discussion of Garland

Garland discloses variable compression of digital images, such as x-rays and MRI images. In particular, Garland discloses that different regions of a source image 900 may be encoded at different quality levels. The source image 900 is displayed on a display 118 of a computer system 100. Through the use of a mouse or other pointing device 114, a user can create borders around regions of the source image that the user would like to encode at higher quality regions than other regions (1014) (Col. 2, lines 8-15).

The user assigns an image quality level to each of the selected regions of the image (1012). An image quality level may also be assigned to the background or non-selected portions of the image. During the encoding process in Garland, the entire image is encoded at the background image quality level. This encoded image is then decoded into a reference frame via a matching decoding process. Next, the encoder determines the regions of the image assigned the next higher image quality level. Differential components indicating the difference between the source image and the reference frame for the pixels in the selected regions are calculated and stored in a differential frame. The differential frame is then encoded. The encoded image, including the reference frame and the differential frame, is then decoded using a matching decoding process and becomes the new reference frame for subsequent encoding iterations. This encoding/decoding process is repeated, in order of increasing image quality

level, for each selected region of the source image (Col. 2, line 44 through Col. 3, line 7).

Applicants' amended claims 1, 32, 63 and 64 now specify that the image is encoded to produce a single compressed copy of the digital image having areas of interest encoded at a first quality level and unidentified areas of the image encoded at a second quality level. The single compressed copy of the image can be decoded at a standard decoder (see, e.g., Applicants' specification, page 15; first paragraph). In contrast, Garland employs hierarchical encoding which involves a plurality of encoding and decoding processes to achieve the final compressed differential frame and the final compressed reference frame for the image, rather than a single compressed copy of the image as set forth in Applicants' claims. Further, once the final reference and differential frames are obtained after the hierarchical encoding in Garland, it must be decoded by a special hierarchical decoder (Col. 8, lines 60-64), rather than a standard decoder as claimed by Applicants.

Garland does not disclose or remotely suggest a method or system for identifying areas of interest in a digital image and encoding the identified areas of interest at a first quality level and unidentified areas of the image at a second and lower quality level than the identified areas in order to produce a single compressed copy of the image which can be decoded at a standard decoder, as set forth in Applicants' claims 1, 32, 63, and 64.

Garland also does not disclose or suggest identifying areas of interest in each digital image in a sequence of

related digital images as set forth in Applicants' claims 63 and 64. For example, the sequence of related images may be a motion picture or a portion of a motion picture, such as a video clip or the like. Garland only discusses single image files, such as an x-ray image or an MRI image. Garland does not disclose identifying areas of interest in a sequence of related images as claimed by Applicants in claims independent claims 63 and 64 (and in dependent claims 4, 5, 35 and 36).

In rejecting claims 4 and 36, which specify that the image is one of a sequence of images in a digital motion picture, the Examiner indicates that Garland at Column 9, lines 13-23 discloses that it applies to sequences of images (Office Action, page 3). Column 9, lines 13-23 of Garland merely mentions MPEG encoding as an encoding technique which may be used with the disclosed invention. From this passage the Examiner apparently assumes that Garland applies its image enhancing techniques to sequences of images. It is clear from the context of Garland that Garland is only concerned with encoding single images, and not a sequence of images as claimed by Applicants. Garland appears to suggest that MPEG encoding can be applied to the encoding of a single image having different regions with different quality levels by simply preserving the difference information in selected regions and discarding the difference information in other regions (Col. 9, lines 13-23).

It would be apparent to anyone skilled in the art that such a process as disclosed in Garland would be unworkable with regard to the encoding of a sequence of images. By

simply removing the difference information from MPEG encoding, artifacts will be introduced in the motion in that part of the image. The result is that some portions of the image can become frozen or stutter, while other portions move smoothly. Garlands disclosure demonstrates a lack of understanding of encoding of motion pictures. Therefore, it must be assumed from the context of Garland that Garland mentions MPEG encoding as a method to convey the multiple overlays (reference frames and differential frames) that represent a compressed x-ray or MRI image, rather than a sequence of images as claimed by Applicants.

Applicants' claims 20 and 51 are amended to include the subject matter of claims 21 and 52, respectively. Claims 21 and 52 now specify that the identified areas of interest are encoded at a first quality level for transmission to a decoder in one or more additional data streams and the unidentified areas of the image are encoded at a second and lower quality level than the identified areas for transmission to the decoder in a separate data stream from that containing the identified areas.

In rejecting claims 20 and 51 the Examiner indicates that Garland discloses encoding the identified areas of interest in one or more additional data streams in Figure 10. In particular, the Examiner indicates that in Figure 10 of Garland, the image is encoded at a background quality level (1016) to produce a first data stream and then the areas of interest are iteratively encoded (1038/1026) to produce additional data streams (Office Action, page 4). Applicants respectfully submit that Figure 10 is a flowchart of the iterative encoding process of Garland

(Col. 3, lines 55-58). This iterative encoding process produces as an end result a reference frame and a difference frame as discussed above. The reference frame and the difference frame of Garland are not equivalent to separate data streams each containing different image areas which may be transmitted to a decoder, as claimed by Applicants. In Garland, different data streams may contain the reference frame and difference frame similar to well known MPEG techniques. However, this is not equivalent to Applicant's much simpler method of sending different areas of the image in different data streams. In Applicants' invention, the image is basically split into areas of interest and the remainder of the areas of the image. The areas of interest are transmitted in one data stream and the remaining areas are transmitted in another data stream. Applicants' additional data streams do not contain difference information or a hierarchical representations of the image, as in Garland. Applicants' separate data streams merely contain different areas of the image. As an example, the areas of interest may be transmitted in one data stream after being encoded using a different encoding algorithm, or at a different Q-factor or resolution than the remaining areas.

Further, Garland makes no mention of transmitting data streams to a decoder. In Garland, the medical images are apparently compressed for storage locally and then decoded when needed at that same location. There is no discussion or suggestion in Garland of encoding different portions of the image for transmission to a decoder in different data streams, as claimed by Applicant.

Discussion of Stark

Stark discloses image processing based on anticipated areas of interest of the image. Stark selects an image processing algorithm based on a comparison of algorithmic regions of interest with stored human visual regions of interest (Abstract). The human regions of interest are obtained by mapping human eye movements when viewing an image (Col. 7, lines 60-64).

Applicants claims 63 and 64 specify image compression based on identified areas of interest, not anticipated areas of interest determined algorithmically as in Stark. Further, Stark makes no mention of image compression where the identified areas of interest are encoded at a first quality level and the unidentified areas are encoded at a second and lower quality level. Stark only generally states that the selected algorithms may then be used in image compression, image enhancement or database query functions, without providing further implementation details for these features (Col. 2, lines 60-63).

Furthermore, Stark discloses only image processing in connection with still images (Col. 3, lines 55-64). As discussed above in connection with Garland, Applicants' claims 63 and 64 are now amended to specify that the image is a part of a sequence of related images.

Further, Garland and Stark do not disclose or remotely suggest the features of Applicants dependent claims. As an example, claims 30 and 61 specify that certain areas of the image are enhanced to artificially create additional areas

of interest. The Examiner indicates that Garland discloses this feature at 912, 914, and 916 of Figure 9 (Office Action, page 5). Applicants respectfully submit that the Examiner has misunderstood the claim language. Claims 30 and 61 have been amended to clarify the claimed invention. In addition to identifying areas of interest and encoding them at a higher quality level than the unidentified areas, the invention set forth in Applicants' claims 30 and 61 also artificially create additional areas of interest by enhancing the quality levels of certain image areas. In other words, an area of an image that would not have been considered an "area of interest" to a viewer is now enhanced to attract the viewers attention. This may be done for artistic or editorial purposes or to attract a viewer's attention to a product in an image for commercial or advertising purposes. Garland discloses the enhancement of identified areas of interest, not artificially creating additional areas of interest which would not have been so identified before enhancement.

The Examiner indicates that the subject matter of Applicants' claims 31 and 62 would have been obvious in view of Garland as an arbitrary decision made by a user of the system. Claims 31 and 62 of the present invention depend from claims 30 and 61. As discussed above in connection with Applicants' claims 30 and 61 additional areas of interest are created by enhancing the quality levels of certain image areas. These created areas of interest are specified in claims 31 and 62 as being image areas containing at least one of a product or a product name. By enhancing the image area which contains a product

or a product name, an area of interest is artificially created which draws the viewer's attention to the product or name. Such a technique may be used in commercial advertisements or product placement spots in television and motion pictures and has a high commercial value. Garland does not disclose or remotely suggest the features of Applicants' claims 31 and 62.

Applicants respectfully submit that the present invention is not anticipated by and would not have been obvious to one skilled in the art in view of Garland, taken alone or in combination with Stark or any of the other prior art references of record.

Further remarks regarding the asserted relationship between Applicants' claims and the prior art are not deemed necessary, in view of the amended claims and the foregoing discussion. Applicants' silence as to any of the Examiner's comments is not indicative of an acquiescence to the stated grounds of rejection.

Withdrawal of the rejections 35 U.S.C. § 102(b) and 35 U.S.C. § 103(a) is therefore respectfully requested.

Conclusion

The Examiner is respectfully requested to reconsider this application, allow each of the pending claims and to pass this application on to an early issue. If there are any remaining issues that need to be addressed in order to place this application into condition for allowance, the Examiner is requested to telephone Applicants' undersigned attorney.

Respectfully submitted,

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